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creased magnification was that one of the umbræ was more decidedly coloured than its companion.

Still the appearance was to me so unusual that I remained half inclined to doubt the evidence of my senses, and regard it as merely an optical illusion. To decide the question I called my wife, who upon looking through the telescope immediately remarked the colour of the spot, comparing it to that of rusty iron.

How long before I began observing, the spot had presented this abnormal appearance I am unfortunately unable to say; but by 21^{h} 15^{m}, or twenty minutes after I first looked at the Sun, all trace of the unusual colour had vanished. I may say in conclusion that the penumbra of the spot presented nothing unusual in its appearance; it was only the umbra that was coloured.

Forest Gate, E.

Jupiter's Third Satellite in Transit, April 11, 1886.

By W. F. Denning.

The satellite crossed the planet as a dusky spot, except when near the limbs, where it was visible as a bright spot. The following notes were made during the progress of the phenomenon. The times are only approximate :—

9^{h} 33^{m} Sat. III. increasing in faintness and drawing very close to the N.E. limb. It seems slightly overshadowed, especially on the side nearest *Jupiter*, where the shading reminds one of the penumbra falling on the Moon prior to a lunar eclipse.

9 49. III. in contact with exterior edge of disc, the satellite is much brighter than the planet's limb, though itself involved in a delicate veil of shade.

9 58. Ingress complete. Satellite growing perceptibly fainter though still far brighter than the limb, on which it is projected as a bold, pearl-like spot just within the periphery.

10 7. III. now quite invisible. It rapidly lost brightness until its tone became indistinguishable from that of the surface. The satellite is evidently in course of transition from a bright to a dark spot. The seeing not very good.

10 48. Light cirrous clouds partly hindered close observation until this time, then III. was immediately seen as a pale dusky spot, rather small, and traversing a bright zone separating two dark belts in the planet's north temperate zone, and lying midway between the N. equatorial belt and N. limb. The S. side of the satellite is evidently darker than the opposite side.

10 55. The satellite assuming a deeper tone. The air has now become steadier; definition very sharp.

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As III. reached mid-transit it became still more obvious, and seemed elongated S.S.E. to N.N.W. The satellite was of a light brown colour, and not nearly so dark as I have seen it when the chord traversed has been nearer the equator.

During the later phases of the occurrence the seeing became very fine, and the complex details of the markings came out very numerously and distinct. The N. equatorial belt showed a large white spot interrupting its continuity. This was central at $11^{h}\ 14^{m}$, and immediately following it there was a great thickening of the belt, extending itself far to the eastwards. This belt was divided lengthwise by a narrow bright line. At times, when a perfectly steady image impressed itself on the eye, a large extent of the N. polar region was observed furrowed with narrow dark belts. They were parallel in direction, though not equidistant from each other or of the same relative distinctness. Close to the pole their distinctive outlines were lost in a confused shading.

The double belt N. of the great N. belt was broad and somewhat faint, with decided condensations here and there. As to the great S. belt its equatorial borders were literally studded by bright spots with intervening and somewhat ill-defined dark patches. From the latter there were delicate wisps of dark-grey matter running to the N.E. and commingling with a delicate, undulating belt at the equator. These dusky markings on the S. side of the equator nearly always trend in this direction, as if their material were evolved from the belt, and in flowing to lower ground at the equator deviated to the E. by the effects of the rapid axial rotation which carries this part of the surface over 458 miles per minute.*

At $11^{h}\ 54^{m}$ the shadow of Satellite III. had entered well upon the N.E. limb, and the contrast with the satellite itself, now between the central meridian and N.W. limb, was most marked. The shadow was much larger and jet black, like an ink spot on white paper. One might readily imagine the appearance due to a perforation in the planet through which the dark depths of the sky beyond could be seen. The satellite, though still perceptible as a dusky spot of increasing faintness, was very inconspicuous compared with the remarkably bold aspect of its shadow.

Bristol: April 19, 1886.

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* I deduce this rate from the rotation of the equatorial white spot = 590·2 minutes, and adopting the equatorial diameter of Jupiter as 86,000 miles.

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Meteor Shower of Halley's Comet. By W. F. Denning.

There is perhaps no star-shower which has, in recent years, stood so much in need of re-observation as the brilliant display of Aquariads discovered by Lieut.-Col. Tupman while cruising off the east coast of Sicily on the mornings of May 1 and 3, 1870. But the radiant point at 325°–2½°, 5° preceding α *Aquarii*, as determined on that occasion, does not rise in our latitude until just before daylight, so that the only prospect of recovering the shower was by morning watches, necessarily rendered very brief and imperfect by the prevailing twilight of the season. These circumstances enabled the shower to elude subsequent observation.

Heis had recorded that on May 2, 1848, he observed many falling stars with bright streaks ("viele Sternschnuppen mit hellen Schweifen"), but it is extremely uncertain whether this relates to a veritable pre-apparition of the special shower witnessed by Col. Tupman.

Observing just before daylight on May 4, 1878, Mr. Corder registered three meteors of this stream. He describes them as notable for great length of path, and found the radiant at 334°–1° (*Observatory*, vol. ii. p. 103). A few other paths observed by him at various times afterwards led him to place the centre at 334°–5°, April–May (*Monthly Notices*, xi. p. 135).

Contemporary with Col. Tupman's observations in 1870, a number of diligent observers were recording meteors in the clear Italian sky, and the materials they accumulated were published at Milan in 1882. I projected 229 paths given in this Catalogue for the interval April 29—May 6, between 13^h and $15\frac{1}{2}^h$, and found that about forty-five of these belonged to the display of Aquariads. The meteors were very bright, with streaks and singularly long trajectories, and their radiant point was indicated at about 335°–9° (*Monthly Notices*, xliii. p. 111–14). This value exhibited such a large discordance with that determined by Col. Tupman that it became more than ever necessary to secure new observations. This was rendered all the more imperative from the suggestive resemblance in date and place of the meteor shower with the computed radiant for Halley's comet (1835, iii.) at its nearest appulse to the earth's orbit on May 4, twelve days preceding its passage through the descending node. Prof. Herschel gives the point 337° ± 0°, May 4, as the theoretical radiant of meteoric particles from this comet (*B.A. Report on Luminous Meteors*, 1874, p. 349), and points out that the agreement with Col. Tupman's shower of 1870 is a significant one, notwithstanding the difference of 10° or 12° in their radiant points.

At the return of this shower in the present year we had a succession of very clear nights, and (the moon being absent) I obtained observations on April 25, 26, 27, 30, May 1, 3, 4, 5, 6, 8 and 9: 117 shooting stars were recorded in watches extending